

WHAT IS CLAIMED IS:

1. A method for microencapsulating a beaded material, said method comprising the steps of :

- 5 a) providing a material enclosed within a bead to obtain a beaded material;
- b) covering the beaded material with a semi-permeable layer made of a polycation cross-linking derivative, to obtain a product; and
- 10 c) covalently linking the beaded material to the semi-permeable layer.

2. The method of claim 1 comprising, after step b), a step of covering the product of step b) with a biocompatible layer; and wherein, in step c), said semi-permeable layer of the product of step b) is further covalently linked to
- 15 said biocompatible layer.

3. The method of claim 1 comprising, prior to step b), a step of covalently linking a polycation to a photoactivatable cross-linking agent to obtain the polycation cross-linking derivative of step b), said photoactivatable cross-linking agent comprising :
- 20 - a N-hydroxysuccinimide ester group; and
- a phenyl azide group.

4. The method of claim 2, wherein step c) of covalently linking said beaded material to said semi-permeable layer or said step of covalently linking said semi-permeable layer of the product of step b) to both the beaded material and the biocompatible layer, is obtained by a step of exposing the polycation cross-linking derivative of the semi-permeable layer to a predetermined dose of light.
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- 30 5. The method of claim 4, wherein the light is UVA light.

6. The method of claim 5, wherein the predetermined dose of light is at least about 2 kJ/m² and less than about 23 kJ/m².
- 5 7. The method of claim 2, wherein the bead and the biocompatible layer comprise a negatively-charged compound.
8. The method of claim 7, wherein the negatively-charged compound is a hydrogel.
- 10 9. The method of claim 8, wherein the hydrogel is alginate.
10. The method of claim 3, wherein the polycation is poly-L-lysine.
- 15 11. The method of claim 3, wherein the photoactivatable cross-linking agent is N-5-Azido-2-nitrobenzoyloxysuccinimide (ANB-NOS).
- 20 12. The method of claim 3, wherein the polycation is poly-L-lysine and the photoactivatable cross-linking agent is N-5-Azido-2-nitrobenzoyloxy-succinimide (ANB-NOS).
13. The method of claim 12, wherein the poly-L-lysine and the ANB-NOS are mixed together in a 1:20 ratio.
- 25 14. The method of claim 1, wherein said beaded material is beaded living cells.
15. The method of claim 14, wherein said living cells are insulin-producing cells.
16. The method of claim 15, wherein said insulin-producing cells are comprised in islets of Langerhans.
- 30 17. A semi-permeable microcapsule comprising :
 - a bead suited to enclose a material; and

- a semi-permeable layer covering the bead, said semi-permeable layer being made of a polycation cross-linking derivative covalently linked to the bead.

- 5 18. The microcapsule of claim 17, further comprising a biocompatible layer covering said semi-permeable layer, said biocompatible layer being covalently linked to the polycation cross-linking derivative of said semi-permeable layer.
- 10 19. The microcapsule of claim 17, wherein said polycation cross-linking derivative is a polycation covalently linked to a photoactivatable cross-linking agent, said agent comprising :
- a N-hydroxysuccinimide ester group ; and
 - a phenyl azide group.
- 15 20. The microcapsule of claim 18, wherein the bead and the biocompatible layer comprise a negatively-charged compound.
21. The microcapsule of claim 20, wherein the compound is a hydrogel.
- 20 22. The microcapsule of claim 21, wherein the hydrogel is alginate.
23. The microcapsule of claim 19, wherein the polycation is poly-L-lysine.
- 25 24. The microcapsule of claim 19, wherein the photoactivatable cross-linking agent is N-5-Azido-2-nitrobenzoyloxysuccinimide (ANB-NOS).
25. The microcapsule of claim 19, wherein the polycation is poly-L-lysine and the photoactivatable cross-linking agent is N-5-Azido-2-nitrobenzoyloxysuccinimide (ANB-NOS).
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26. The microcapsule of claim 25, wherein the poly-L-lysine and the ANB-NOS are in a 1:20 ratio.
- 5 27. The microcapsule of claim 17, wherein said microcapsule allows passage of molecules with a defined viscosity radius.
28. The microcapsule of claim 27, wherein said viscosity radius is equal or inferior to about 2.7nm.
- 10 29. The microcapsule of claim 17, wherein said material is living cells.
30. The microcapsule of claim 29, wherein said living cells are insulin-producing cells.
- 15 31. The microcapsule of claim 30, wherein said insulin-producing cells are comprised in islets of Langherans.
- 20 32. A pharmaceutical composition comprising:
 - a plurality of semi-permeable microcapsules, each one being as defined in claim 17 and, each one of said microcapsules enclosing a material; and
 - a pharmaceutically acceptable carrier.
- 25 33. The composition of claim 32, wherein said material is living cells.
34. The composition of claim 33, wherein said living cells are insulin-producing cells.
- 30 35. The composition of claim 34, wherein said insulin-producing cells are comprised in islets of Langherans.

36. A method for treating diabetes in a subject, said method comprising the step of:
- administering to said subject, an effective amount of the composition as defined in claim 32.